DOMESTIC VIOLENCE AND THE RISK OF INFANT AND CHILD MORTALITY- A CASE CONTROL STUDY

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DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT OF THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY FOR THE DEGREE OF M.D BRANCH XIV COMMUNITY MEDICINE TO BE HELD IN MARCH 2008

Certificate

This is to certify that **"DOMESTIC VIOLENCE AND THE RISK OF INFANT AND CHILD MORTALITY-A CASE CONTROL STUDY"**, which is being submitted as thesis requirement for M.D Degree Branch XIV-COMMUNITY MEDICINE examination of the Dr. M.G.R. Medical University of Tamil Nadu, is a bonafide work of the candidate – **Dr. Sunitha Henry Kannan**.

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Certificate

This is to certify that **"DOMESTIC VIOLENCE AND THE RISK OF INFANT AND CHILD MORTALITY-A CASE CONTROL STUDY"**, , is a bonafide work of the candidate – **Dr. Sunitha Henry Kannan,** post graduate in Community Medicine of Christian Medical College, Vellore. This work has been carried under my guidance and supervision in partial fulfillment of the regulation of Dr. M.G.R. Medical University of Tamil Nadu for M.D- Branch XIV (COMMUNITY MEDICINE) examination to be held in March 2007.

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1. INTRODUCTION AND JUSTIFICATION

Infant mortality rate (IMR) is considered as one of the most sensitive indicators of health status of a community .India is still among the countries with high infant mortality rates. IMR has slowly declined from 204 in 1911-15 , to 129 per 1000 live births in 1970 remained static for several years at around 127 ,declined to 114 in 1980 and came down to 67 in 2002 . Despite the significant decline, the rates are very high as compared to developing countries, now mostly in the range of 5- 8 per 1000 live births[1]. Statistics from the Ministry of Health in India for 2005reported an infant mortality rate of 68 per 1000 live births and an estimated neonatal mortality rate of 43.4 per 1000 live births, substantially lower rates than a decade earlier[2]. Over the past several years, the official infant mortality rate for India has hardly changed, suggesting that inroads into neonatal mortality are difficult to achieve, requiring much greater investment in safer motherhood and neonatal care programs.

India is a vast country with widely varying socio-cultural regions. It is possible that a single approach may not be applicable to the rest of the country. There is a need to compare experiences of other areas where IMR has been brought down to see whether more than one approach is needed in India to bring down IMR to a level similar to developed countries

Despite the substantial reduction in the number of infant and child deaths observed in the recent decades, around 10.6 billion children die every year before reaching their fifth birthday. A global picture of what these children die of has emerged as a collective effort of WHO, UNICEF, and a group of independent technical experts, the Child Health Epidemiology and Reference Group. Most deaths in the under five age group can still be attributed to just a handful of diseases and are avoidable through existing interventions. Six conditions account for 70% to 90% of all these deaths. These are pneumonias (19%), diarrheas (18%), malaria (8%), measles (4%), and HIV/AIDS (3%) and deaths due to neonatal conditions such as preterm birth, birth asphyxia, and infections (37%).Malnutrition increases the risk of dying, in all these cases[3]. In India and in many developing countries elsewhere, children are especially vulnerable to these diseases, both because of their frequency and widespread malnutrition, and because of a lack of socio economic support for good health. As a result, strategies to decrease mortality have included vertical interventions, such as immunizations, other specific preventive measures, and management guidelines for ill children, but also more general approaches such as emphasis on food security and female education.

Other than physical diseases many other causes had been implicated in the cause of infant and child mortality. Preterm birth, malnutrition, low birth weight, poverty and many other reasons are found to be significantly associated with infant and child mortality. The role of the psychosocial components of health is yet to be explored. The role of maternal intelligence and its impact on malnutrition had been assessed and found significant[4]. The psychological factors and the social factors need to be looked into in detail and evaluated

appropriately, in addition to the known biological factors of causes of childhood mortality, to bring down the infant and child mortality.

This study has attempted to study the important problem of infant mortality in a different perspective. Domestic violence is highly prevalent in India. There are significant psychological and health consequences due to violence. Abuse during the pregnancy is also widely recognized as a significant societal and public health issue. Studies have identified abuse as a modifiable risk factor for low birth weights[5]. It is well known that low birth weight is among the major causes associated with infant and child mortality. Several studies, mostly in the high income countries, have looked at the association of physical violence and the risk of preterm labour, fetal distress and low birth weight. Very little is known about the possible effect of violence against women on the survival of their post neonatal offspring. Though the above mentioned adverse outcomes do cause infant mortality, the possibility that the abused and chronically stresses mother having difficulties in coping with the multiple needs of her small child cannot be under estimated. One such study was attempted in Leon, Nicaragua which found a positive association between the domestic violence and the risk of infant mortality[6].

In this study we attempt to find the association between the intimate partner violence and psychiatric morbidity and its association with infant mortality.

2. AIMS AND OBJECTIVES

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Using a case control design, this study aims to assess the effect of domestic violence against mothers and pre-existing maternal depression on under-five mortality.

OBJECTIVES

1. To investigate the impact of violence against mothers on mortality risks for their offspring before five years of age.

2. To determine if any association between pre-existing maternal depression and infant or child death.

3. LITERATURE

REVIEW

"We will spare no effort to free men, women, and children from the abject and dehumanizing conditions of extreme poverty, to which more than a billion of them are currently subjected"

United Nations Millennium Declaration,2000[7]

3.1 Introduction to violence

Various forms of violence have probably always been a part of human history, and happenings. Its impact can be seen in nearly every part of the world, in different forms. Overall, violence is a leading cause of death in the ages 15-44 years. The human cost in grief and pain, cannot be calculated and much of it is almost invisible. Some forms of violence-terrorism, wars, riots, and civil unrest, is made visible to audiences on a daily basis, thanks to technologies, but much more violence occurs out of sight in homes, workplaces and even in the medical and social institutions set up the care for people. Many of the victims are too young, too weak or too ill to protect themselves. Others are forced by societal conventions or pressures to keep silent about their experiences. Some causes of violence are easy to see. Others are deeply rooted in the social cultural and economic fabric of human life[8].

3.2 Defining violence

The World Health Organization defines Violence as:

The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death or psychological harm, mal-development or deprivation[9].

As per this definition framed by the WHO, intentionality is associated with the committing of the act itself, irrespective of the outcome it produces. Excluded from the definition are unintentional injuries such as most road traffic accidents and burns.

The inclusion of the word “power”, in addition to the phrase “use of physical force”, broadens the nature of a violent act and expands the conventional understanding of violence to include those acts that result from a power relationship, including threats and intimidation. The “use of power” also serves to include acts of omission or neglect, in addition to the more obvious violent acts of commission. Thus “the use of Physical force or power” should be understood to include neglect, and all types of physical, sexual and psychological abuse, as well as suicide and other self-abusive acts[8].

This definition covers a broad range of outcomes-including psychological harm, deprivation and mal-developement. It reflects a growing recognition among researchers and practitioners of the growing need to include violence that does not necessarily lead to death but that nonetheless poses a substantial burden on individuals, families, communities and health care systems worldwide. Many forms of violence against women, children and the elderly do not lead to death or disability.

3.3 Violence against Women.

Violence against women, otherwise known as Gender based violence, is a term used to refer to violent acts committed against women especially. This type of violence targets the victim's gender primarily. The United Nations General Assembly defines "Violence against women" as "any act of gender-based violence that results in or is likely to result in physical, sexual, or mental harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life"[10]. November 25th has been declared by this same body as the International Day for the elimination of violence against women.

Article 2 of the Convention on the Elimination of all forms of Discrimination against Women (CEDAW) elaborates that violence against women includes sexual, physical, and psychological violence in the:

1. Family such as battering, sexual abuse of children, female genital mutilation/cutting and rape;

2. Community such as sexual abuse, sexual harassment and intimidation, trafficking and forced prostitution; and

3. State such as poorly drafted or unenforceable laws for violence against women, law enforcement agents who violate women, the lack of facilities and education for prevention and treatment of women exposed to violence, the sanctioning and reinforcement of unequal gender relations. The state's indifference and neglect in creating opportunities and entitlements for women in regard to employment, education, participation and access to social services also perpetuates gender-based violence[11].

3.31 Violence by intimate partners/domestic violence

Intimate partner violence occurs in all countries, irrespective of social, economic, religious or cultural group. Women's organizations around the world have long drawn attention to violence against women and to intimate partner violence in particular. Through their efforts, violence against women has now become an issue of international concern. Initially viewed as a human rights issue, now it is increasingly seen as an important public health problem.

3.32 The extent of the problem

Intimate partner violence refers to any behavior within an intimate relationship that causes physical, psychological or sexual harm to those in the relationship .Such behavior includes:

Acts of physical aggression-such as slapping, hitting kicking and beating,

Psychological abuse-such as intimidation, constant belittling and humiliating,

Forced intercourse and other forms of sexual violence.

Various controlling behaviors-such as isolating a person from their family and friends, monitoring their movements, and restricting their access to information or assistance.

Selected population based studies done from 1982-1999, from all around the world, between 10 and 69%of women reported being physically assaulted by an intimate male partner at some point in time in their lives[12]. For many of these women physical assault was not an isolated event but part of a continuing pattern of abusive behavior.

Research suggests that physical violence in intimate relationships is often accompanied by psychological abuse and in one-third of the cases to one-half by sexual abuse[13, 14].

The table-1 gives prevalence of domestic violence around the world[15].

Table 1: Prevalence of domestic violence across the world

COUNTRY	SAMPLE SIZE	PREVALENCE (%)
INDUSTRIALISED COUNTRIES		
Canada	12,300	29
Japan	796	59
New Zealand	314	29
Switzerland	1500	20
United Kingdom	Random	25
United States	Random	28
ASIA AND PACIFIC		
Cambodia	Random	16
India	6902	45
Korea	619	38
Thailand	Random	20
MIDDLE EAST		
Egypt	Random	35
Israel	1826	32
AFRICA		
Kenya	612	42
Uganda	Random	41
Zimbabwe	966	32
LATIN AMERICAN AND CARIBBEAN		
Chile	Random	26
Columbia	6097	19
Mexico	650	30
Nicaragua	Random	52
EAST EUROPE		
Estonia	2315	29
Poland	Random	60
Russia	172	25
Tajikistan	550	23

There are studies done in India suggesting a widespread prevalence of domestic violence. In evidence from Rural Maharashtra, conducted on a sample size of 500 women, almost half the women said they had been slapped, hit, kicked or beaten by their husbands at some time. 24% of the women reported having been kicked by their husbands at some point during their married

life, and 44% were reportedly kicked during pregnancy. 12% were specifically threatened by their husbands with having kerosene oil poured on them to set them on fire. 30% of the physically assaulted victims required medical care[16]The recent NFHS data 2005-2006 estimates the prevalence of domestic violence to be nearly 40%[2]. Family Violence is increasingly recognized as a major health problem with serious health and economic consequences in India as well as other countries.

3.33 Violence across the lifespan of a woman

Violence has a profound impact on women. Even before birth , in some countries ,with sex selective abortions as is reflected in the female :male sex ratio at birth, and shortly after birth, when female babies are killed, by parents who are desperately hoping for a son to keep the family name, it continues to affect women throughout their lives.

Each year millions of girls undergo female genital mutilation. Female children are more likely than their brothers to be raped or sexually assaulted by family members, by those in positions of power or trust or by strangers. In some countries, when an unmarried or adolescent is raped, she may be forced to marry her attacker, or she may be imprisoned for committing a criminal act. Women who are away from home, imprisoned or isolated are more prone to attacks. A study in the Department of Paediatrics in Mt. Sinai school of Medicine, New York looked the reproductive characteristics of women who underwent domestic violence in their homes or suffered from intimate partner violence. Positive association was found for race, employment

and parity. Protective factors were later age at first intercourse and child birth, higher education and use of contraception[18].

Table 2: Violence across the life span of a woman

PHASE	TYPE OF VIOLENCE
PRE BIRTH	Sex-selective abortions, effects of battering during pregnancy on outcomes
INFANCY	Female infanticide ,physical, sexual and psychological abuse
GIRLHOOD	Child marriage, genital mutilation, incest, pornography, child prostitution
ADOLESCENCE& ADULTHOOD	Dating violence, economically coerced sex(e.g. school girls having sex with sugar daddies in return for school fees),incest, sexual abuse in the workplace, rape, sexual harassment, forced prostitution, pornography, trafficking partner violence; marital rape; dowry abuse and murders; partner homicide; psychological abuse; abuse of women with disabilities; forced pregnancy
ELDERLY	Forced "suicide" or homicide of widows for economic reasons; sexual, Physical and psychological abuse [17]

3.4 The centrality of Gender equality

Emanating from the Millennium Declaration, the Millennium Development Goals (MDGs) were formally adopted at a United Nations General Assembly meeting in September 2002[19] . They formally bind 191countries to join forces to focus on eight development priorities: poverty and hunger; primary education; gender equality; child mortality; maternal health; HIV/AIDS and other serious diseases; environmental sustainability; and global partnerships for development.

Since they are intended to monitor progress, each goal has specific targets and indicators that can be measured and assessed, enabling governments to modify policy in order to achieve the MDGs and honor their commitments

The centrality of gender equality for sustainable human development has been well articulated in UN conferences of the 1990s. At these global conferences, governments recognized the contributions that women make to economic development and the costs borne by societies as a result of the multiple disadvantages and gender discrimination women face in nearly every country. Among world leaders, a general consensus acknowledges the pivotal role of gender equality in achieving all the other MDGs. Hence, the differentiated needs of men, women, girls and boys are extensively integrated within the MDGs.

3.41 The Millennium Development Goals

Millennium Development Goal 3 calls for the promotion of gender equality and women's empowerment. The target for measuring this goal's progress is to eliminate gender disparity in primary and secondary education no later that 2015. This goal is based on the understanding that women are generally poorer and less educated than men and account for a greater segment of the population living in absolute poverty. Their illiteracy rates remain high in comparison to men's. In modern urban sectors, significant gender disparities exist in employment opportunities with a larger proportion of women occupying lower level and semi-skilled positions in comparison to men. Wide wage differentials are apparent. Traditional and cultural barriers and practices (e.g., the continuing prevalence of female genital mutilation/cutting, forced early marriage, wife inheritance practices, and prohibitions on land ownership) continue to create serious status,

health and economic disadvantages for women and girls. Due to the narrow range of the progress indicators, the Millennium Task Force on Education and Gender Equality decided to broaden the operational framework to include:

1. Human capability as measured by education, health and nutrition scope;

2. Access to resources and opportunities in the paid non-agriculture sector;

3. Participation in decision-making in the public sphere through an increased number of seats in national government; and

4. Security.

The addition of security stems from the recognition of women's particular vulnerability to violence in private and public spheres. In times of conflict and in peacetime, the lack of security exerts a heavy toll on women, households and society and retards progress towards sustainable development. In its contribution to the Millennium report, the Task Force on Education and Gender Equality identified seven interdependent, interlinked and strategic priorities critical to women's empowerment. These priorities include to

(1) Strengthen opportunities for post primary education;

(2) guarantee reproductive and sexual health and rights;

(3) Invest in infrastructure to reduce women's and girls time burden;

(4) guarantee women's and girls inheritance rights;

(5) guarantee women's and girls equality in employment;

(6) Increase women's seats in national parliaments and local governmental bodies; and

(7) combat violence against women and girls[20].

The UN Secretary General endorsed the seven priority areas in his opening remarks to the 49th Session of the Commission on the Status of Women (CSW) in March 2005, in New York

In the last decade, the issue of violence against women has moved from the shadows to the foreground of commitments to attain sustainable development. Women's rights advocates have mobilized within and across countries and regions to secure significant changes in national, regional and international standards and policies addressing gender-based violence. Landmark achievements today include the:

1. Convention on the Elimination of Violence against Women (1993);
2. Dakar Platform for Action (1994);
3. Beijing Platform for Action (1995);
4. African Plan of Action to Accelerate the Implementation of the Dakar and Beijing Platforms for Action for the Advancement of Women (1999);
5. UN Resolution 1325 on Women Peace and Security (2000); and
6. Protocol to the African Charter on Human and Peoples Rights on the Rights of Women in Africa (2003).

Millennium Development Goals 4 and 5 commit governments to reducing child mortality and maternal mortality rates and is a call for better reproductive health services. They are based on the understanding that sexual violence causes multiple reproductive health problems, teenage pregnancy, unsafe sexual behavior and sexually transmitted diseases. Unwanted pregnancy, pregnancy complications, miscarriage, low birth weight and maternal mortality are also implications of domestic violence. According to WHO, depending upon the country, between 10-50% of women are victims of physical abuse by immediate partners and family members[15].

3.42 Public health approach

Despite the fact that violence has always been present, the world does not have to accept it as an inevitable part of the human condition. As long as there has been violence, there have also been systems-religious, philosophical, legal, and communal-which have grown up to prevent or limit it. None has been completely successful, but all have made their contribution to this defining mark of civilization.

The factors that contribute to violent episodes –whether they are factors of attitude and behavior or related to larger social, economic political and cultural conditions can be changed. Violence can be prevented and its impact reduced, in the same way that public health has affected other aspects of human quality of life.

The public health approach to violence is based on the rigorous requirements of the scientific method. In moving from problem to solution, it has four key steps:

1. Uncovering as much basic knowledge as possible about all the aspects of violence-through systematically collecting data on the magnitude, scope, characteristics and consequences of violence at local, national and international levels.

2. Investigating why violence occurs –that is, conducting research to determine the causes and correlates of violence, the factors that increase or decrease the risk for violence; the factors that might be modifiable through interventions.

3. Exploring ways to prevent violence, using the above said information, by designing, implementing, monitoring and evaluating interventions

.4. Implementing interventions that appear promising and determining the cost effectiveness of programmes.

Public health is above all characterized by its emphasis on prevention. Rather than simply accepting or reacting to violence, its starting point is the strong conviction that violent behavior and its consequences can be prevented[21].

3.5 The dynamics of intimate partner violence

Recent research from industrialized countries suggests that the forms of domestic violence are not the same for all the couples who experience violence. At least two patterns have been identified[22].

1. A severe and escalating form of violence characterized by multiple forms of abuse, terrorization and threats, increasing possessive and controlling behavior on the part of the abuser.
2. A more moderate form of relationship violence where continuing frustration and anger occasionally erupts into physical aggression.

Populations may differ in a number of ways including the extent to which they possess particular risk factors for violence such as youth, poverty, or family history of abuse. Johnson for example, made a distinction between common couple violence that is found in general population samples and the more extreme "terroristic" violence that is typically experienced by shelter populations of battered women[22]. Researchers hypothesize that community based surveys are better suited to detect the more moderate form of violence-also called “common couple violence”-than the severe form also known as battering. This could be a reason why community based surveys in industrialized nations pick up more instances of violence even though a majority of women come to the attention of service providers.

In traditional societies, wife beating is largely regarded as a consequence of a man’s right to inflict punishment on his wife .This is usually justified culturally with the traditional notions of

the proper roles of men and women. In most of these settings, women are expected to look after children and their homes, and show their husbands respect and obedience. If a man feels that his wife has failed the role or overstepped the limits, then violence may be his response. Studies done in Uttar Pradesh and Tamil Nadu, show that wife beating is widely accepted both by women and their husbands –as a husband's right and a woman's due. At the same time, cultural norms and economic realities constrain the overwhelming majority of women from agreeing that a severely beaten woman is justified in leaving her husband[23].

3.51 Causes and Circumstances for VAW

While there is no single cause of abuse, certain combinations of personal, situational, sociocultural and legal factors can increase the likelihood of a partner abusing a woman .This has been described as the ecological model of dynamics of domestic violence.

At the **individual** level – the partner may have been abused in childhood, witnessed domestic violence, had no father, rejected his father, or frequently drink alcohol.

At the **family** level, there may be degrees of marital conflict, so much to do with the control of wealth and very much influenced by poverty and unemployment.

At the **community** level, the woman may be ostracized or isolated due to lack of mobility and resources

At the **societal** level – masculinity is usually defined by male dominance and reflected through patterns of honor and power relations. Punishment and 'correction' of 'erring' women and children is often culturally accepted.

At the **state** level – laws against violence are not implemented. The state may not punish violence, therefore perpetrators violate with impunity[24].

3.52 Risk factors for domestic violence

Levinson's vast ethnographic study from 90 societies throughout the world identified four factors that when taken together are strong predictors of societies where violence against women is especially prevalent. These are

Economic inequality between the sexes

Patterns of using physical violence for conflict resolution

Male authority and decision making in the home

Divorce restrictions for women.

Two other cross cultural studies suggest that rigid gender roles, especially definitions of masculinity linked to dominance, toughness or male honour are all highly correlated with violence against women. Factors like stress, educational levels of the partners, social isolation and social change especially threatening and uncontrollable change are some of the factors that seem to increase the risk of spousal violence. In addition unstable marriages with low levels of satisfaction and those in which conflict is dealt with in an aggressive manner are also likely to be physically violent[25].

Poverty or patriarchy, alcohol or aggression; the causes of intimate partner violence have been contested by social scientists for decades. Underlying the controversy is an inescapable problem: evidence for causation of intimate partner violence is weak when assessed with epidemiological criteria. Most research has been from North America and, with some exceptions, has been based on women accessing sources of help, with data obtained from shelters, official records, or clinic samples. However, during the past decade, the research base has been expanded substantially by several well designed cross-sectional studies of violence against women from developing

countries, which focus on both women and men, and by ethnographic studies. This increase in data has enabled researchers to identify associations that pertain to more than one setting, explore hypotheses critically, and understand the plausibility of associations when considered in the light of what else is known about a society. Furthermore, understanding of the mechanisms through which many associated factors contribute to intimate partner violence has been greatly advanced, helping clarify interventions needed for primary prevention. A cross-sectional study done in Nigeria looked at factors associated with intimate partner violence and found significant with alcohol use, lower socioeconomic strata, increasing age disparity among couples and spouse unemployment[26]. In a study done in Canada on groups of subjects who were undergoing treatment for de addiction to alcohol, tobacco, cocaine or cannabis, when administered questionnaires that measured several aspects of their psychosocial personalities, found significant association in univariate analysis for violence and all the above mentioned substances, but in multivariate analysis found a strong association between violence, alcohol and cocaine[27].

Understanding the causes of intimate partner violence is substantially more difficult than studying a disease. For example, diseases usually have a biological basis and occur within a social context, but intimate partner violence is entirely a product of its social context. Consequently, understanding the causes of such violence requires research in many social contexts. Most diseases can be investigated with various objective measures, but measurement of intimate partner violence has posed a challenge. Furthermore, measurement of social conditions thought to be risk factors, such as the status of women, gender norms, and socioeconomic status poses difficulties, especially across cultures. Although a consensus has emerged on the need to explore male and female factors and aspects of the dynamics of relationships, this has been done

in very few studies[25].

3.53 Measuring violence

In surveys women are usually asked from a list of specific acts of aggression, including being slapped or hit kicked beaten or threatened with a weapon, whether they have been abused. A focus on acts alone can hide the atmosphere of terror that sometimes permeates violent relationships. In a national survey of violence against women in Canada, one-third of women who had been physically abused said that they had feared for their lives at some point during the relationship[28].

Although International studies show that physical violence is more conceptualized and measurable, qualitative studies find that psychological abuse and degradation even more intolerable than the physical violence[2].

3.6 Consequences of violence

3.61 Health: VAW has been associated with STDs and HIV/AIDS, kidney infections, reproductive health problems, substance abuse, attempted suicide and death. Violence during pregnancy can lead to abortions, fetal growth retardation, premature labor and miscarriages[30].Violence may act as a stressor, affecting a woman's ability to obtain her required nutrition and medical care. Studies show that women experiencing violence in pregnancy, are more likely to register late for antenatal check ups and to report having unintended pregnancies[31, 32].

3.62 Social: The fear generated by violence limits women's full development, their contribution to society and their mobility, limiting their access to activities and basic resources[33].Children who have witnessed acts of violence against their mothers can develop a propensity to commit or submit to acts of partner violence later in life[34].

3.63 Psychological consequences:

For women who are beaten or sexually assaulted, the emotional and physical strain can lead to suicide. These deaths are dramatic testimony to the paucity of options for women to escape from violent relationships. Research in the United States has shown that battered women, as compared to women not living with violent men, are five times more likely to commit suicide[30]. Research suggests that abused women endure enormous psychological suffering because of violence. Many are severely depressed or anxious, while others display symptoms of post-traumatic stress disorder. They may be chronically fatigued, but unable to sleep; they may have nightmares or eating disorders[35]. Many turn to alcohol and drugs to numb their pain; or become isolated and withdrawn[36]. In the United States, women battered by their partners have been found to be between four and five times more likely to require psychiatric treatment than non-abused women[37]. The First ever WHO multi-centric study on domestic violence and its magnitude also showed that the abused women were also twice as likely as non-abused women to have poor health and physical and mental problems, even if the violence occurred years before. This includes suicidal thoughts and attempts, mental distress, and physical symptoms like pain, dizziness and vaginal discharge. The study was carried out in collaboration with the London School of Hygiene and Tropical Medicine, PATH and national research institutions and women's organizations in the participating countries[38]. Rape and childhood sexual abuse can cause similar

psychological damage. One occurrence of sexual aggression may be sufficient to create long-lasting negative effects, especially if the child-victim does not subsequently receive appropriate support. Like violence against women in the family, child abuse often continues for many years and its disabling effects can carry over into adult life. For example, the reduced self-esteem of women who have been abused in childhood may result in their making little effort to avoid situations where their health or safeties are in jeopardy. A study carried out in Boston, Los Angeles and San Diego in the United States, Juarez, Mexico, and San Juan, Puerto Rico, showed a strong link between sexual abuse victimization in early life, and involvement later in life in sexual behaviours that place women at risk of contracting HIV[30].

3.64 Infant and child mortality rate. In spite of technical advances that have increased survival of children in developing countries, infant mortality rates are still at least 10 times higher in developing countries than in developed countries. Most infant deaths occur in the Perinatal and neonatal periods, mostly due to prematurity, intrauterine growth retardation, and congenital causes; later deaths are more likely to be the result of infection. It may be useful to identify risk factors that predict early infant mortality; especially those that have the potential for intervention with modest resources. Environmental factors are associated more strongly with later infant mortality. Globally, the most common immediate causes for early childhood mortality include infectious conditions such as diarrhoeal diseases, respiratory infections, malaria, and measles. Children in developing countries especially in India are vulnerable to these diseases, both because of their frequency and widespread malnutrition, and because of a lack of socio economic support for good health. A study done in Jamaica examined the relationship between environmental and social factors and perinatal mortality. It was seen that though social

deprivation did not affect mortality much, but specific environmental factors did. The study showed statistically significant increased odds of having a perinatal death among mothers who lived in rural parishes, older mothers (aged 30 +), single parents, no other children in the household, large number of adults in the household, mother unemployed, the major wage earner of the household not being in a managerial, professional or skilled non-manual occupation, the household not having sole use of toilet facilities, smaller mothers and those classified as obese or undernourished[39]. Violence may interfere with the mothers' ability to care for the child through emotional distress or because they are physically prevented from obtaining care for the child. A study conducted in India found that children of battered women were more likely to receive less food and be malnourished than those women who were not battered[40].

An abused and chronically stressed mother may experience difficulties in coping with the multiple needs of her small child[41]. New evidence emphatically shows that maternal mental health is a critical and previously ignored factor in the association between social adversity and infant failure to thrive in low income countries[42]. A child's health and development is strongly influenced by the relationship between child, parents and other caregivers. The key is for the caregiver to be receptive to the child's state and needs, to interpret them correctly and be quick to react appropriately[43].This is a critical factor in healthy growth[44]. The absence of sensitive, responsive care is associated with malnutrition and failure to thrive[45, 46, 47]. The influence of such care on healthy cognitive and social development as well as on survival has been documented. Maternal depression has been shown to be associated with many adverse health outcomes among the offspring of depressed women, including preterm birth, low birth weight, newborn irritability, developmental delays, somatic complaints, sleep problems, child abuse, and psychiatric and neurobehavioral disorders. Although considered to be attributable in part to genetic factors, some

of the behavioral problems observed among children of depressed women are thought to arise from the negative parenting behaviors that these women display[48]. Providing continuous care and attention of children is a demanding task, and poor mental health in mothers might be expected to have adverse consequences on their children's health and development[49]. Violence may limit a woman's access to resources needed to take adequate care of her child. Women who experience physical violence often have feelings of powerlessness, social isolation and economic dependency[50].

In most developed countries, pregnancies are planned, complications are few and outcomes are generally favorable for both mother and infant. Adverse outcomes are far more frequent in the developing world. Even if both the mother and infant survive, pregnancy complications or problems at delivery or during the neonatal period can lead to severe maternal or infant morbidity.

Despite the recognized importance of mortality and severe morbidity as measures of adverse pregnancy outcome, much of the published research in the area of adverse pregnancy outcomes, especially those outcomes related to maternal nutrition, are based on proxy outcomes for mortality and severe morbidity. The most commonly studied of these proxies have been low birth weight (LBW), including its constituents, preterm birth and intrauterine growth restriction (IUGR) and congenital anomalies. Despite widespread recognition of the importance of LBW in developing countries, reliable data on its magnitude and distribution remain limited. It is estimated that 20.5 million LBW infants were born in 1995 and that 16% of all newborns in developing countries were LBW. This is taken from data reported in the WHO Collaborative Study of maternal anthropometry and pregnancy outcomes[51]. Very few studies, mostly in high-income countries, have suggested that physical violence against pregnant women increases the

risk of preterm labour or delivery, fetal distress or death, and low birth weight off-spring. Low birth weight remains an important cause for infant and child mortality. In a few meta-analysis researchers have found a significant association between abuse and low birth weight. The relation between adverse outcome of pregnancy and abuse during pregnancy may occur through direct and indirect mechanisms. Direct mechanisms involve trauma to the pregnant abdomen leading to premature labour, rupture of membranes, placental abruption or a ruptured uterus. Abuse during pregnancy has been associated with low socioeconomic status, poor maternal weight gain, anaemia, an unhealthy diet, sexually transmitted diseases and psychological morbidity[5, 50, 52, 53].These variables, as well as stress and lack of social support, have been identified as risk factors for low birth weight. It has been argued that if the health risks associated with abuse are sequelae of violence, then abuse may be a previously unrecognized cause of low birth weight. Even these are preliminary findings and the ideal situation is that little is known about the possible effect of violence against women on the survival of their offspring. According to a case control study done in Ghana to examine the risk factors for child mortality, an increased odd of death was found if the child's father beat the mother, among other causes[54].Further research is needed on the influence of violence on women and its influence on infant and child mortality[6].

3.65 Added health care costs

The costs to society of violence against women are tremendous, in terms of health care alone. A proportion of these costs are for treating serious physical injury. A substantial amount is also spent on psychological problems including managing anxieties and symptoms which happier, more confident, women may be able to tolerate, ignore or shrug off[55].There are effects on

productivity and employment. Women experiencing violence may have a reduced contribution to society as well as to their own potential self-realization. In Canada's national survey on violence against women, 30% of reported wife assault incidents led to time off from regular activities, and 50% of women who were injured took sick leave from work.[15] The cost of violence includes also the welfare loss. A study done by the department of economics, University of Maryland measured this loss. A given mortality, and its distribution across age groups, determines a reduction in life expectancy and this was calculated using the marginal willingness to pay approach. The health dimension of the welfare cost of violence for 73 countries was estimated. On average, 1 year of life expectancy lost to violence is associated with a yearly social cost of 3.8% of GDP. The health dimension increases the estimated social costs of violence by 40% in the United States and by 57% in Latin America[56]. Increased public spending on justice, shelter for victims, medical care and social services, preventative education and activities are other economic consequences. VAW also produces losses in productivity, labor absenteeism, and increases in mortality and morbidity[57].

3.7 Interventions

Research into violence against women is increasing, but there are no widely agreed definitions of the different forms of such violence that could be used to standardize research findings. Millions of women are experiencing violence or living with its consequences. The sheer scale of violence against women forces the question of what it will take to translate increasing recognition of the global prevalence of this abuse into meaningful, sustained, and widespread action[58].

One of the key issues to emerge is that inequalities in gender and income are the principal causes of violence. One of the more shocking findings is the fact that health-care workers are often

themselves the problem, rather than the solution[59].Laws alone are not enough. Prevention should be seen in terms of economic and educational empowerment of women in broad terms. "Eradicating violence against women requires coordinated action and commitment by many actors; including governments, civil society, the judiciary, police, media, health-care workers, educators and the international community", argues Noeleen Heyzer, Executive Director of UNIFEM[60].

Successful interventions are those that address the status of women: economically, in societal attitudes, in interpersonal relationships, and in communities. Few studies have assessed the effect of economic interventions on gender violence. Such interventions have generally consisted of small-scale micro credit schemes whose effectiveness can vary between settings It is tempting to suggest that the shift in attitude required at all levels of society is too enormous to be contemplated by a world in which patriarchy still dominates personal and political life With the increasing feminization of poverty, economic inequalities urgently need to be addressed[61].Central to this process is the need to support women's unpaid work as carers, in the home and in communities. Public resources need to be invested to enable access to affordable food, water, and shelter, and to set up childcare facilities. These interventions "not only enable women to access paid work, but can have a multiplier effect in terms of enabling children, particularly girls, to go to school". This issue is not relevant only in the developing world; in developed countries women are penalized in terms of wages, pensions, and benefits by the decision to have children[59].

But first, doctors and other health-care professionals need to face up to the problem and debate a strategy to deal with it.

4. METHODOLOGY

4.1 The setting

The Department of Community Health, Christian Medical College, Vellore India has been working in Kaniyambadi Block for the past 40 years. This region is a geographically defined area of 127.4 km2 with a population of 109,872. The community program operates in all 85 villages in the area. The majority of the population follows the Hindu religion. The language spoken is Tamil. A significant proportion is from the lower socio-economic strata. Agriculture and animal husbandry are the major occupations.

The Community Health and Development (CHAD) Program is run by the Department. The program has four major components: health care, animal husbandry and agriculture, adult and non-formal education and community development. The front line of CHAD's health care structure is the Part-time Community Health Worker (PTCHW). They are traditional midwifes who live in the village who have been trained by the program. PTCHW is supported by the community health team (including a doctor, nurse, community extension worker, Health Aide), which visits every village every two weeks. Cases requiring greater medical input are referred to the base hospital. The base hospital has 120 beds. Patients who cannot be managed in the community are referred to the base hospital. The hospital treats a

wide variety of patients including those tuberculosis, leprosy, rheumatic heart disease, and AIDS. Normal delivery, Caesarean sections, minor surgeries and sterilization, child health clinics form a major component of health care.

The major thrust of the social development program of the department is the empowerment of women. This is achieved through formal and non-formal education and through economic development of the region. The program has set up two community-based organizations for socio-economic development of the region. The CHAD program has close links with the community who are part of many decision-making processes. The CHAD program in conjunction with other governmental agencies is responsible for health care. The program coordinates many of its activities (e.g. immunization, family welfare services) with health professionals from the governmental health organizations. The Program works different government departments and agencies for activities related to economic development, animal husbandry and agriculture, education and community development. At the community level the staff of the department work with village leaders and the local administration.

4.2 The surveillance system & data base

The surveillance system consists of 4 tier monitoring system. The block has been divided into regions with specific personnel in charge of the health of the different regions. The system involves the community health worker, the health aide, the community nurse and the doctor. Every week the community health worker reports to the health aide about pregnancies, deliveries, births, deaths, morbidity, marriages, immunization, and couples

eligible for contraception in the village. This information is verified by the nurse and subsequently by the doctor. Data on migration is also collected. Data obtained by the surveillance system is computerized. The program managers feed the information back to the health team every month.

The program enumerated the whole population living in the block in 2007 as part of a census. Each person living in the block has a specific identification number. The surveillance system has been used to up date the census data every month. The data for the whole block is collated and reviewed monthly by the entire health team consisting of the community health workers, health aides, community health nurses, doctors and other development staff. Each mobile team also receives specific feedback on the health indicators for their local area. This process has been refined over the years.

The database also collected information on the causes of death in the population. This data is verified by a verbal autopsy done by the members of the health team and a report is submitted.

4.3Study population

The mothers of the cases and the controls were interviewed.

Case definition: Cases are defined as children born alive to women in the database, who died before the age of five years, between January 2000 and December 2006.

The following are the exclusion criteria:

1. If the mother was not the primary care giver
2. Children from single parent homes
3. Children with birth weight less than 2 kg

4. Preterm babies

5. Babies with congenital illnesses.

6. Obvious co-morbidity.

A total of 380 deaths have been recorded in this defined time frame.

Control: Matched controls living in the same street and who are healthy were identified. One control was chosen per case, matched with each case for age (+/- 2 months) and sex. Cases and controls were recruited after obtaining consent from the parents.

4.4 Sample size estimation

Sample size estimation was done with the following formula, discussed by Schleesman, [62] and the required sample size was calculated:

$$n = [(1+1/c)^* \frac{\bar{p}\,\bar{q}\,(Z\alpha/2+Z\beta)^2}{d^2}]$$

Prevalence among controls (general population) – P control

$$\text{Prevalence among cases} = \frac{OR\ (Pcontrol)}{1+ Pcontrol\ (OR-1)}$$

$\bar{p}$ = (Pcases + Pcontrols)/2 $\qquad$ $\bar{q}$ = (1- $\bar{p}$)

c- Number of times the control

$Z\alpha/2$ = 1.96 (0.05/2, upper tail probability for 0.025 ….for 95%CI)

$Z\beta$ = 0.8416 (upper tail probability for 20% - i.e. 80% power)
$Z\beta$ = 1.282 (upper tail probability for 10% - i.e. 90% power)
d = difference between Pcases and Pcontrols

The relative frequency of exposure among the controls in the target population was taken to be 40% from the NFHS data.

The hypothesized odds ratio was taken to be 2.5 from the study done in Nicaragua.

So, with Pcontrol=40 and OR=2.5,

Pcases =62

Then the required sample sizes will be 75 in each arm. Assuming 20% loss to follow up, the total sample size is 90 cases and 90 controls. However for this study, we sampled 82 cases and 79 conrtols,

4.5 Outcome and exposure variables

Information on socio-demographic characteristics, socio economic status, use of health services such as antenatal care, details of pregnancy and delivery, immunization practices, medical illness, educational level of mother, parity, occupation and social network of the mother were obtained. Questions regarding the decision making role and the resource controller in the family were asked

Details regarding the father's age, occupation, literacy, educational status, and abuse of alcohol and beedi /cigarettes were collected.

The primary exposure variable studied was domestic violence. Only data on physical and sexual violence by the current intimate partner were included. Separate questions were asked to determine the severity and the temporal sequence of events. Moderate violence was defined as slap (open hand on face), whereas hit (on body), punches (with closed fist), kicks

and beats (repeated behavior), use or threaten with weapon or objects were classified as severe violence. Forced sexual acts were considered as sexual violence and were considered to be severe violence. Lifetime experience of partner violence, and violence during the index pregnancy as well as in the year following were also assessed. Mothers who had experienced violence were asked to state, using a four step scale from none to very much, and the degree to which violence had affected their emotional well being. Frequency of violence was measured dichotomously as whether frequent or rare.

. The secondary exposure variable studied was pre-existing maternal depression. The mothers of cases and controls were also assessed for Psychiatric morbidity which included screening for pre-existing depression.

The primary investigator underwent training at the department of Psychiatry, CMC, Vellore regarding the proper administration of the tools involved in the study.

4.6 Methods and attempts at blinding:

Cases and controls were extracted from the computerized data base. The principal investigator was not told about the case/control status. The principal investigator visited the subject's home, established rapport, and obtained consent for the interview. Details of the exposure were obtained prior to information on the outcome so as to prevent bias in data collection. Also structured interviews were employed to minimize such bias.

4.7 Tools used for the assessment

1. A specially designed Performa to assess socio-demographic characteristics.

2. Structured clinical interview for DSM III (patient edition) (Spitzer et al 1990) which is a widely used standardized interview for screening for psychiatric disorders. The instrument has nine sections that are further subdivided .Each section is scored for “a lifetime” and scores for each section run from 0-3. The Tamil version of the Structured Clinical Interview for DSM III R was used to assess psychiatric morbidity. Standard procedures, including translation-back translation, were employed to obtain semantic and conceptual equivalence.

3. Modified Abuse assessment screen: While the Abuse Assessment Scale (AAS) has been validated for present domestic violence (within a year) during pregnancy, the modified AAS[63] specifically request information related to "ongoing" domestic violence, not necessarily limited to the period during pregnancy.

4.8 Statistical analysis

The collected data was entered for analysis using the software EPIDATA 3.0.Cross validation was done by double entry. The data was checked for missing values and outliers. This data was exported to SPSS for windows 12.0.

Statistical analysis software SPSS for windows 12.0 was employed for the analysis of data. Mean, standard deviations and range were employed to describe continuous variables, while frequency distributions were obtained for dichotomous variables. Chi-squared and pvalue were used to asses the significance of associations for categorical data. Odds ratio and confidence intervals was calculated to assess the estimate of the relative risk

The data was subjected to a multivariate analysis by logistic regression. Binary logistic regression with backward conditional method was done. This was to exclude the effect of confounding. Selected variables that were significant at the Univariate level of analysis were included in the regression model.

5. RESULTS

The Mid year population for the time period January 2001 to December 2006 was 1,02, 927. During this period, there were a total of 9397 births of which 9225 were live births. The population of 1-4 year old group was 38,886.The proportion of antenatal women who received care was 99.7 percent. There were 172 still- births and 157 early neonatal deaths. The infant death rate for this period was 33.9 per thousand live births and the 1-4 year mortality rate was 1.7 per thousand populations. This gives an under five mortality rate of 41.2 per thousand live births.

Table 3: Prevailing death rates in the described population during Jan 2001 – Dec 2006

	No.	**Rate per 1000**
Total population	1,02,927	
1-4 yrs population	38886	
Live births	9,225	
Total births	9,397	
Crude Birth rate		13.0
Still births	172	18.3
Early Neonatal Deaths	157	16.7
Perinatal mortality rate		35.0
Infant deaths	313	
Infant mortality rate		33.9
1-4 yrs deaths	67	1.7*
Under 5 deaths	380	41.2

The denominator for 1-4 yrs deaths is the 1-4 yr population.

The common cause of under-five year deaths was seen to be due to infectious diseases accounting for nearly 35% of the mortality, mostly pneumonia (Table-4). Acute Gastroenteritis (AGE), Central nervous system infection which included meningitis and

encephalitis, infections and neonatal sepsis also were among other causes of death. Deaths in the neonatal period accounted for 46 % of the total deaths.

Table 4: Causes of under 5 death in the total population

Causes of death	No.	Disease specific mortality rate (%)
Pneumonia	73	21.0
AGE	23	6.7
Accidents	16	4.7
Anomalies	43	12.6
Low birth weight (< 2Kg)	41	12.0
CNS infections	12	3.5
Birth asphyxia	28	8.2
Neonatal sepsis	34	10.0
Others	110	32.3

5.1 PROFILE OF THE STUDY POPULATION

Of the 380 under-five deaths, our study followed up 100 cases, which were enumerated from the year of death of 2006 and backwards. Of these 100 cases, 82 mothers of cases were interviewed. As per exclusion criteria, five mothers were excluded. One mother lost her spouse and was a single parent, and so was excluded from the study. Two women had separated from their husbands and gone to their mothers houses and so were unavailable for the interviews. Two mothers had died of serious illness. The remaining had moved out from that particular locality or was unavailable at the time the investigator had visited.

The information obtained from the database showed that the socio-demographic characteristics of the non-responders, parental education, occupation and parity were comparable to those of the responders.

Age-Sex profile of deaths in the study population

The table-5 describes the age-sex profile of the under five deaths in the study population. Neonatal deaths account for 37.8% of the total cases studied. Infant deaths were 36.8 % and deaths in the age group One to four years were 25.6 %. The total numbers of male and female deaths in the study group were 47 and 35 respectively

Table 5: Age-sex profile of deaths in the study population

AGE GROUPS	**MALE**		**FEMALE**		**TOTAL**	
	NO	%	NO	%	NO	%
NEONATAL	16	51.6	15	48.4	31	37.8
INFANT	20	66.7	10	33.3	30	36.8
1 – 4 YEAR AGE GROUP	11	42.4	10	47.6	21	25.6
UNDER FIVES	47	57.3	35	42.7	82	100

The table -6 describes the causes of death in the study population

Table 6: Causes of death in the study population

DISEASE	No	Disease specific proportionate mortality rate
Pneumonia	24	29.2
AGE	11	13.5
Accidental deaths	7	8.5
Meningitis	13	15.9
Early neonatal deaths	25	30.5
Anomalies	2	2.4

Major anomalies were excluded from the study as per the exclusion criteria. Deaths due to Pneumonia constituted nearly one third of the total deaths and deaths in the early neonatal period constituted another one third. The total number of neonatal deaths were 31, and 25 of them were in the early neonatal period.

Profiles of the cases and control

A total of 82 cases and 79 controls were studied. The numbers of male among cases and controls were 47 and 44 respectively and the numbers of females were 35 in both arms. Distance to the nearest health centre from their place of residence was less than a kilometer for 53.2 percent of cases and 46.3 percent of controls. The proportion of home deliveries in the cases and control arm were 12.2 and 10.1 percent respectively. Among the hospital borne, the Caesarean section rates in the case and control arm were 12.2 and 8.9 percent respectively. Comparable numbers in the cases and control arms had birth weights more than 2.5 kg. The percent of cases with APGAR less than 8, in the case arm were 17.1 as compared to 1.3 in the control arm. Also the percent of cases requiring admission to nursery shortly after birth were 42.7 and 8.9 percent respectively. The order of birth for the cases and the controls were not different.

Table7: Profile of cases and controls

Variables		CASES (n =82)		CONTROL (n=79)		TOTAL (N =161)	
		NO	%	NO	%	NO	%
Sex	Male	47	57.3	44	55.7	91	56.5
	Female	35	42.7	35	44.3	70	43.5
Distance to health Centre	< 1km	38	53.2	42	46.3	80	49.7
	> 1 km	44	46.8	37	53.7	81	50.3
Place of delivery	Hospital	72	87.8	71	89.9	143	88.8
	Home	10	12.2	8	10.1	18	11.2
Type of delivery	Normal	70	85.4	68	86.1	138	85.7
	Instrument	2	2.4	4	5.1	6	3.7
	LSCS	10	12.2	7	8.9	17	10.6
Birth weight	2-2.49 kg	19	24.7	9	12.7	28	18.9
	2.5- 3kg	33	42.9	31	43.7	64	43.2
	3-4 kg	25	32.5	31	43.7	56	37.8
APGAR	< 8	14	17.1	1	1.3	15	9.3
	> 8	68	82.9	78	98.7	146	90.7
Admitted in Nursery	Yes	35	42.7	7	8.9	42	26.0
	No	47	57.3	72	91.1	119	74.0
Order of birth	1st	19	23.2	25	32.1	44	27.5
	2nd	33	40.2.	37	47.4	70	43.8
	3	22	26.8	15	19.2	37	23.1
	>3	8	9.7	1	1.3	9	5.6

Parental profile

Various characteristics of the parents of the cases and the controls were studied. The following tables describe the parental characteristics of both cases and controls. Socio-economic profiling of the cases and controls were also done.

The mean age of the mothers of the cases was 26.6 years as compared to the mothers of the controls, which was 25.2 years. Marriage at age less than 18 had occurred in 52.4 percent of the mothers of cases and 41.8 percent of the mothers of controls. The number of women who had given birth to more than 2 children was 20.5 percent among the mothers of cases and 36.6

percent among the mothers of the controls. About one third of them had undergone tubectomy as a permanent method of family planning soon after the time of the birth of the index child. Nearly 65 percent of the interviewed women were literate, as being able to read and write in at least their own language. The mean of the number of years of education that the mothers had received was calculated and in the cases was 6.27 with a standard deviation of 3.87 years .in the mothers of controls, the mean of the number of years of education was 7.88 with a standard deviation of 3.85. About three quarters of the women were not gainfully employed, being housewives at the time of the interview.

Table 8: Parental profile

MOTHER		CASES (n =82)		CONTROL (n=79)		TOTAL (n =161)	
		NO	%	NO	%	NO	%
Age at marriage	<18	43	52.4	33	41.8	76	47.2
	18-20	26	31.7	21	26.6	47	29.2
	21-24	8	9.8	21	26.6	29	18.0
	25-29	4	4.9	3	3.8	7	4.3
	>30	1	1.3	1	1.2	2	1.2
Parity	0	25	32.1	19	23.2	44	27.5
	1	37	47.4	33	40.2	70	43.8
	2	15	19.2	22	28.8	37	23.1
	3	1	1.3	4	4.9	5	3.1
	>3	0	0	4	4.9	4	2.5
No. of living children	0	27	34.2	26	31.7	53	32.9
	1	37	46.8	34	41.5	71	44.1
	2	14	17.7	18	22.0	32	19.9
	3 or more	1	1.3	4	4.9	5	3.1
Tubectomy	done	23	28.8	34	43.0	57	35.4
Literacy	Literate	51	62.2	53	67.1	104	64.6
Occupation	Housewife	56	68.3	63	79.7	119	73.7
FATHER							
Literacy	Literate	56	69.1	64	81.0	120	75.0
Occupation	Unskilled labourer	39	47.6	27	34.2	66	41.2

The average age of the fathers of cases was 34.4 and the standard deviation was 6.14 .The average age of the fathers of the controls was 32.9and the standard deviation was 4.58.

Nearly seventy-five percent of the fathers were literate with a mean number of years spent in schooling being 7.62 years with a standard deviation of 3.5 years.

Table 9: Parental profile of the continuous variables

VARIABLE	CASES (n =82)		CONTROLS (n=79)		TOTAL (n =161)	
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION
Age of mother	26.6	4.2	25.2	3.3	25.95	3.80
Education of mother	6.27	3.87	7.88	3.35	7.08	3.69
Age of father	34.49	6.14	32.99	4.58	33.73	5.45
Education of father	7.0	3.6	8.2	3.3	7.62	3.50
Size of family	4.84	1.7	6.06	2.5	5.45	2.24
No of children	1.51	0.864	2.10	0.80	1.81	0.883

The average family size in the cases was 4.84 with a standard deviation of 1.7 and in the control group was 6.06 with a standard deviation of 2.5 members. The average number of children in the family was 1.81 with a standard deviation of 0.883

Socio economic indicators were taken as proxy markers for the socio-economic status. About thirty percent of the families of the cases lived in huts or kuchha houses while only 22 percent of the controls did so. About 88 percent of the total people interviewed lived in houses of their own. About half of these houses were single roomed houses. Seventy percent of the water supply was from the taps provided by the public system. Only about thirty percent of the

studied population used latrine facilities in their houses. Nearly ninety percent of the families of cases were under debt while about 80 percent of the families of controls were under debt. Nearly 9 percent of the studied population had fewer than three meals per day sometimes because of inability to buy food. The majority of the population was of the Hindu religion, about ninety five percent.

Table 10: Socio-Economic indicators

		CASES(n =82)		CONTROL (n=79)		TOTAL (n =161)	
		NO	%	NO	%	NO	%
Type of house	Hut, kuchha	26	31.7	18	22.8	44	27.3
	Pukka	56	68.3	61	77.2	117	72.7
Own house	Yes	72	87.8	70	88.6	142	88.2
	Rented	10	12.2	9	11.4	19	11.8
Size of house	1 room	44	53.7	39	50.6	83	51.6
	>1room	38	46.3	40	49.4	78	48.4
Water source	Tap	64	78.0	59	74.7	123	76.4
	Others	18	22.0	20	25.3	38	23.6
Latrine use	Yes	20	24.4	28	34.4	48	29.8
Meals per day	3 or more	71	86.6	76	96.2	147	91.3
	<3	11	13.4	3	3.8	14	8.7
Debt	Yes	74	90.2	64	81.0	138	85.7
Religion	Hindu	76	92.7	76	96.2	152	94.4
	Others	6	7.3	3	3.8	9	5.6

5.2 VIOLENCE IN THE STUDY POPULATION

Physical abuse was experienced by 52.4 percent of the mothers of cases and 34.2 percent of the mothers of controls. There was a prevalence of 36.6 percent of sexual abuse among the mothers of the cases and 15.2 percent among the mothers of controls. The Violence experienced could be classified as severe among 30.5 percent of the mothers of cases and 22.8 percent of the mothers of controls.

Table 11: Type of Violence among the cases and controls

	CASES (n =82)		CONTROL(n=79)		TOTAL (n =161)	
	NO	%	NO	%	NO	%
Physical abuse	43	52.4	27	34.2	70	43.5
Sexual abuse	30	36.6	12	15.2	42	26.1
Severe violence	43	52.4	18	22.8	61	37.9
Severe abuse during pregnancy	22	26.8	5	6.3	27	16.8
Abused by husband	50	96.1	30	96.7	80	96.3
Frequently abused	20	38.4	12	38.7	32	38.5

The Total number of women who gave history of lifetime experience of violence was 52 (63.4%) among the cases and 32 (39.2%) among the controls. The odds ratio of exposure to violence, ever and the outcome of infant death were calculated to be 2.684 with confidence intervals of 1.419-5.075. The risk of child mortality when the mother was exposed to severe violence was 3.736 with confidence intervals of 1.890-7.385.

Table 12: Violence among the cases and controls

Violence		CASES (n =82)		CONTROLS(n=79)		OR	CI
		No	%	No	%		
Ever	Yes	52	63.4	31	39.2	2.684	1.419-5.075
	No	30	36.6	48	60.8		
Severe	Yes	43	52.4	18	22.8	3.736	1.890-7.385
	No	39	47.6	61	77.2		

During pregnancy 30.5 percent of the mothers of cases were abused and 26.8 of them suffered severe abuse. Among the mothers of controls, 11.4 percent were abused during pregnancy and for 6.3 percent of the women, it was severe. 38 percent of all mothers described themselves as who were abused frequently.

Table 13: Violence during the index pregnancy

Violence During index pregnancy		CASES (n =82)		CONTROLS(n=79)		OR	CI
		No	%	No	%		
Ever	Yes	25	30.5	9	11.4	3.411	.475-7.888
	No	57	69.5	70	88.6		
Severe	Yes	22	26.8	5	6.3	5.427	1.939-15.185
	No	60	74.2	72	93.7		

For exposure to violence during the index pregnancy, the risk of child mortality following were 3.411 with confidence intervals of 0.475 -7.888 while the risk for exposure to severe violence during pregnancy was 5.427 with confidence intervals of 1.939 -15.185.

5.3 PRE-EXISTING MATERNAL DEPRESSION IN THE STUDY POPULATION

The screening tool used in this study picked up all common psychiatric disorders. One mother of a case was found to have psychosis and two had history suggestive of manic psychosis. One mother of a case suffered from anxiety neurosis and two mothers of controls suffered from the same. There were five mothers of controls with somatoform disorder and two mothers of cases with the same.

The lifetime experience of depression by the mother was totally about thirty percent, with 40.2 percent of the mothers of cases having had depression and 21.5 percent of controls having experienced depression. The percent of mothers of cases who had at least one major episode of depression was 18.3 percent and in the mothers of controls was 15.2 percent. The remainder suffered from what was classified as mild to moderate depression

Table 14:Pre-existing Maternal Depression among the cases and controls

		Cases (n =82)		Controls (n=79)		Total (n =161)	
		No	%	No	%	No	%
depression	Yes	33	40.2	17	21.5	50	31.1
	No	49	59.8	62	78.5	111	68.9
Severity of depression	major	15	18.3	5	6.3	20	12.4
	Mild to moderate	18	22.0	12	15.2	30	18.6

The odds ratio for exposure factor of maternal depression and outcome variable of infant death was 2.456 with confidence intervals of 1.226 and 4.920.

5.4 RISK FACTORS FOR UNDER-FIVE MORTALITY

The cases and controls were compared with respect to a number of variables. They included factors related to the socioeconomic profile and the parental profile.

Of the ten maternal factors studied, four were found to be significantly associated with under-five mortality (table 15). The significant variables were parity more than one with odds ratio of 2.236 and 95% confidence intervals of 1.099 - 4.547, Education less than grade five with odds ratio of 1.996 and confidence intervals of 0.989 - 4.027, Occupation being housewife with odds ratio of 1.828 and 95% confidence intervals of 0.890 - 3.753 and pre-existing maternal depression with odds ratio of 2.456 with confidence intervals of 1.226 - 4.920.

Of the seven paternal factors that we examined for association with under-five mortality, four were found to be significantly associated. Illiteracy had an odds ratio of 1.905 with 95% confidence interval of 0.914- 3.967. Use of alcohol by the father was found to have an odds ratio of 2.070 with confidence intervals of 1.102- 3.891.

Table 15: Risk factors for under five year child death (Univariate)

MOTHER		CASES(n =82)		CONTROL(n=79)			
		NO	%	NO	%	p-value	OR (95%CI)
Age at marriage	<18	43	52.4	33	41.8	0.116	1.537
	18 & above	39	47.6	46	58.2		(0.825-2.865)
Parity	0-1	52	63.4	62	79.5	0.019	2.236
	>1	30	36.6	16	20.5		(1.099-4.547)
Tubectomy	Done	23	28.0	34	43.0	0.034	0.516
	Not done	59	72.0	45	57.0		(0.268-0.994)
No. of living children	At least one	56	68.3	52	65.8	0.434	0.894
	More than one	26	31.7	27	34.2		(0.463-1.726)
Type of delivery	Normal	70	85.4	68	86.1	0539	1.060
	Instrumental/LSCS	12	14.6	11	13.9		(0.438-2.564)
Place of delivery	Home	10	12.2	8	10.1	0.435	1.233
	Hospital	72	87.	71	89.9		(0.460-3.303)
Education	0- grade 5	29	35.4	17	21.5	0.05	1.996
	> grade 5	53	64.6	62	78.5		(0.989-4.027)
Literacy	Illiterate	31	37.8	26	32.9	0.314	1.239
	Literate	51	62.2	53	67.1		(0.648-1.227)
Occupation	Working	26	31.7	16	20.3	0.070	1.828
	House wife	56	68.3	63	79.7		(0.890-3.753)
Depression	Yes	33	40.2	17	21.5	0.008	2.456
	No	49	59.8	62	78.5		(1.226-4.920)
FATHER							
Education	0- grade 5	63	76.8	53	67.1	0.115	1.627
	> grade 5	19	23.2	26	32.9		(0.812-3.260)
Literacy	Illiterate	25	30.9	15	19.0	0.06	1.905
	Literate	56	69.1	64	81.0		(0914-3.967)
Occupation	Unskilled worker	9	11.0	11	13.9	0.371	0.762
	Others	73	89.0	68	86.1		(0297-1.953)
Alcohol use	Yes	52	63.4	36	45.6	0.017	2.070
	No	30	36.6	43	54.4		(1.102-3.891)
Smoker	Yes	43	52.4	18	22.8	0.000	3.736
	No	39	47.6	61	77.2		(1.890-7.385)
Substance abuse	Yes	34	41.5	15	19.0	0.002	3.022
	No	48	58.5	64	81.0		(1.481-6.169)
Decision making	In-laws	8	9.8	13	16.5	0.246	0.549
	Husband/ wife/both	74	90.2	66	83.5		(0.214-1.407)
SOCIO-ECONOMIC PROFILE							
Religion	Hindu	76	92.7	76	96.2	0.267	2.000
	Non-Hindu	6	7.3	3	3.8		(0.483-8.290)
Debt	Yes	75	91.5	65	82.3	0.067	2.308
	No	7	8.5	14	17.7		(0.878-6.064)
Can not buy food always	Yes	38	46.3	55	69.6	0.002	2.654
	No	44	53.7	24	30.45		(1.390-5.066)
Meals per day	Less than 3	9	11.0	0	0	0.002	2.137
	At least 3	73	89.0	79	100		(1.808-2.526)

Paternal smoking was associated with under-five deaths and an odds ratio of 3.736 with 95 % confidence interval of 1.890-7.385 was obtained. With persons who both used alcohol as well as who smoked, the risk of having an under-five death in the house was 3.022 with confidence intervals of 1.481-6.169.

The socio-economic indicators that were associated with a risk of under-five mortality were the presence of debt, inability to buy food always and having less than three meals a day.

Factors associated with infant death by using multiple regression models:

The factors suspected to be significant in causing child mortality were studied with the help of a multiple regression model. After adjusting for father's alcohol consumption, paternal smoking, severe violence to mother, socioeconomic status, infants' birth weight, parity of mother, education, occupation and age of mother, affordability to buy food, debts, husband's education and maternal depression, the variables which remained significant were severe violence, paternal smoking and parity of mother. The odds ratio for exposure to severe domestic violence causing under-five deaths was 2.981 with 95% confidence intervals of 1.371- 6.480. Paternal smoking was found to be a risk factor with a risk of 3.542 and 95% confidence intervals of 1.630- 7.696. Multiparity was another risk factor with odds ratio of 2.849 and 95% confidence intervals of 1.246- 6.516. The odds ration for birth weight as a risk factor was 0.419 and the 95%CI was 0.174 and 1.008.

Table 16: Risk factors for under- five child deaths by Multivariate Analysis

FACTOR	B	SE	SIGNIFICANCE	EXP(B)	95% LOWER CI	95% UPPER CI
PATERNAL SMOKING	1.265	0.396	0.001	3.542	1.630	7.696
SEVERE VIOLENCE	1.092	0.396	0.006	2.981	1.371	6.480
BIRTH WEIGHT	-0.870	0.448	0.052	0.419	0.174	1.008
PARITY	1.047	.422	0.013	2.849	1.246	6.516

a Variable(s) entered on step 1: alcohol, smoke, severe violence, socio-economic status, Birth wt, parity of mother, education of mother, age of mother, occupation of mother, affordability to buy food, debts, husband's education and maternal depression

*Husband smoking
**Presence of severe violence
***Birth weight of child (continuous variable)
**** Parity of mother (more than 1)

A second model for logistic regression was created using the most significant factors – education, occupation, and parity of mother, paternal use of alcohol, paternal smoking, severe violence, maternal depression, and birth weights. This showed a minimal change in the odds ratio.

Table 17: Risk factors for Under-five deaths by multivariate analysis taking only the most significant variables

FACTOR	B	SE	SIGNIFICANCE	EXP(B)	95% LOWER CI	95% UPPER CI
PATERNAL SMOKING	1.307	0.392	0.001	3.697	1.715	7.969
SEVERE VIOLENCE	1.059	0.391	0.007	2.883	1.340	6.201
PARITY*	0.985	0.416	0.18	2.677	1.184	6.054

A Variable(s) entered on step 1: education of the mother, parity, occupation of mother, paternal use of alcohol, paternal smoking, severe violence, maternal depression, birth weight groups
* Parity of mother (more than 1)

Factors associated with death of children after 7 days of life:

Among cases twenty five children died during the early neonatal period. As early neonatal deaths were mostly related to perinatal complications, a separate analysis was done after excluding those early neonatal deaths.

Univariate analysis showed that the odds of child death when the mother was exposed to severe violence were 4.198 (95% CI 2.023-8.709). The risk of child mortality when the mother had an education of grade five or less was 2.328 (95% CI1.107-4.896) as compared to the mothers who had studied beyond 5^{th} grade. For parity of more than one, OR was 2.151 (95% CI 1.007-4.896). For mothers with at least one living child already, the OR was 2.049 (95% CI 0.94-4.453). When the mother had depression, the risk of infant death was 2.666 (95% CI 1.273-5.582). The risk of a child dying when the father consumed alcohol was 2.068 (95% CI 1.041-4.109) times higher than that of a child whose father did not consume alcohol. The child of a father who smoked was 4198 times as likely to die (95% CI 2.023-8.709)

A third model for logistic regression was created to look at the factors associated with child deaths, excluding the 25 early neonatal deaths. The variables which were significant in univariate factors analysis were entered in to the regression model. These were education, occupation, and parity of mother, the number of living children, and paternal use of alcohol, paternal smoking, severe violence, and maternal depression. The final model showed paternal smoking (OR 4.3, 95%CI- 1.87-9.9), severe violence (OR 3.39, 95%CI – 1.48 – 7.77) and

mother having more than one living child prior to this child (OR 2.98, 95%CI – 1.15 – 7.68) as risk factors for under-five deaths (Table .)

Table 18: Factors affecting death of child after 7 days to 4 years:

FACTOR	B	SE	SIGNIFICANCE	EXP(B)	95% LOWER CI	95% UPPER CI
Number of living children*	1.090	0.484	0.024	2.975	1.153	7.677
Paternal smoking	1.461	0.426	0.001	4.310	1.869	9.939
Severe violence	1.222	0.422	0.004	3.394	1.483	7.767

Variable(s) entered on step 1: alcohol, smoke, severe violence, parity, occupation of mother, food, number of living children, depression, education of mother, birth weights.
* No living child/ one living child before the birth of the index child as reference

Population attributable risk:

The population attributable risk for violence as a factor for under-five child death was calculated to be 40 percent using the prevalence of domestic violence from NFHS 3 data, as 40 percent of all married women. The population attributable risk for severe violence was calculated to be 50 percent. The population attributable risk for violence using the odds ratio obtained from the multivariate analysis is 46.5 %. After excluding early neonatal deaths form the analysis, the population attribution risk for severe violence as a risk factor for under-five mortality was found to be 47.9%.

5.5 FACTORS ASSOCIATED WITH VIOLENCE

Some of the characteristics of the study population were found to be significant risk factors for violent behaviour or violence in the household. The chi-squared test and p-value was

done for these variables. These are listed below in the table. Many variables were found to be significant in their association with violence. Odds ratios were not calculated for the same.

Table 19: Characteristics of cases and controls and Violence

Characteristics		No violence (n=100)		Severe violence (n=61)		Total	chi^2	p-value
		NO	%	NO	%			
MOTHER								
Age at marriage	<18	39	39	37	39.3	76	7.130	0.006
	>18	61	61	24	60.7	85		
literacy	Illiterate	28	28	29	47.5	57	6.326	0.01
	Literate	72	72	32	52.5	104		
occupation	Housewife	80	80	32	63.9	119	5.072	0.020
	Others	20	20	22	36.1	42		
no of children	0-1	70	70	44	72.1	114	0.037	0.497
	>1	30	30	17	27.9	47		
depression	Yes	22	22	28	45.9	50	10.09	0.001
	No	78	78	33	54.1	111		
literacy	Illiterate	21	21	19	31.7	40	2.276	0.094
	Literate	79	79	41	68.3	120		
occupation	Unskilled worker	14	14	6	9.8	20	0.604	0.302
	Others	86	86	55	90.2	141		
alcohol use	Yes	46	46	42	68.9	88	7.984	0.004
	No	54	54	19	31.1	73		
smoker	Yes	28	28	33	54.1	61	10.966	0.001
	No	72	72	28	45.9	100		
Substance abuse	Yes	21	21	28	45.9	49	11.097	0.001
	No	79	79	33	54.1	112		
	High							
religion	Hindu	94	94	58	95.1	152	0.084	0.536
	Others	6	6	3	4.9	9		
Debt	Yes	82	82	58	95.1	140	5.717	0.013
	No	18	18	3	4.9	21		
cant buy food always	Yes	32	32	36	59.0	68	11.335	0.001
	No	68	68	25	41.0	93		

The characteristics of the mother that were studied were her at marriage, her literacy and years of education, occupation, the number of children she has, and whether depression was

present or not. Among the characteristics of the mothers, Age at marriage being less than 18 years, illiteracy, and occupation as housewife were significantly associated to violence. Violence was also associated with maternal depression. Among the characteristics of the father, paternal alcohol use of alcohol and smoking were significantly associated with a high possibility of being violent.

The socio-economic factors that were significantly associated with violent behaviour were the presence of debt in the household, and the inability of the family to be able to buy food at all times.

6. DISCUSSION

The study focused on the prevalence of domestic violence against the mothers of children who had died between Jan 2001 and Dec2006. The disease and age sex specific mortality rates were ascertained. The association between domestic violence and under-five child mortality and pre existing maternal depression and under-five child mortality was tested. Several risk factors for under-five child mortality were studied.

Infant and child mortality rates

The National Family Health survey conducted in 2005-2006, by the International Institute for population sciences, Bombay, made available the various demographic and socio-economic indicators of India as well as its states. A comparison can be drawn from the tables 17 and18.

Table 17: Demographic indicators, a comparison

Indicator	India	Tamil Nadu	Kaniyambadi
Crude Birth rate	22.69	13.4	13.0
Infant mortality rate	68	52.6	33.9
Total fertility rate	2.68	1.8	1.4
Antenatal coverage	77	99	99.6
Hospital deliveries	41	90	90.4
Immunization	43.5	80.8	99.8
Contraception use	56.3	60	59

Table 18: Socio-economic indicators, a comparison

Indicator	India	Tamil nadu	Kaniyambadi
Adult male literacy	67.6	67.9	75
Piped water supply	42.0	84.2	76.4
Toilet use	44.5	42.9	29.8
Pucca house	41.4	69.6	72.7

Our study area, Kaniyambadi block had demographic and socio-economic indicators that were very similar to those of Tamil Nadu state. The crude birth rate was substantially lower than that of India as a whole. The Total fertility rate of the country was also higher that that of Tamil Nadu and our study area. Antenatal coverage was nearly complete in the state and our study area while India had a larger proportion to cover. Hospital deliveries and immunization coverage were very good and reflects very well on the state. The socio-economic profiles of all three were very comparable.

As compared to India and even Tamil Nadu, our study area has a low infant mortality rate. Much of this can be attributed to the intense reproductive and child health programmes that are run by the CHAD unit. But overall our study area does not differ much from Tamil Nadu state. Both the demographic indicators and the socio-economic indicators are quite comparable. This shows that the findings of the study can be generalized.

As described by the WHO, the usual causes of child mortality are infectious diseases, such as pneumonias, diarrhoeal diseases, meningitis and neonatal illnesses[3]. Our study population also reflected a similar disease specific proportionate mortality pattern. According to rates in India, there usually is a striking difference in gender specific mortality rates, the females having a higher mortality rate than the males. But our study population did not reflect so. Though female infanticide is reported, no evidence for the same could be extracted from the current study

Cases and controls were matched for gender, locality and date of birth. For the cases and controls, distance from the nearest health centre was less than a kilometer in 53.2 and 46.3 percent respectively. This can be seen as sufficient distribution of primary health care facilities by the public health care delivery system in the area.

The proportion of institutional deliveries among the cases and controls were comparable. The proportions of babies born by normal vaginal deliveries, instrumental deliveries and lower segment caesarian sections were also comparable. Birth weights were also comparable for more than 2.5 kg weight babies. The numbers of cases admitted in the nursery for care were more than that of the controls. A proportion of neonatal deaths of 37.8 percent in the case arm could explain this.

Prevalence of violence

The prevalence of violence in the general population, according to the control group was 34.2 percent which was expected, very similar to the data from Tamil Nadu collected by Jeejeebhoy[23]. NFHS 3 also gives the prevalence of violence in Tamil Nadu to be 40%[2]. Abuse during pregnancy was 11.4 % according to our study and 13 % according to the India SAFE study. The prevalence of sexual violence in the control group was found to be 15.2 percent which corresponds with other international figures. The perpetrators of abuse were almost always the husbands except for two of the cases and one of the controls.

Studies done in Nicaragua show that at least one fourth of the under-five deaths could be attributed to physical or sexual violence by a partner (odds ratio of 2.1)[6]. In the current study, the proportion of women who gave history of lifetime experience of violence was 63.4% among the cases and 39.2% among the controls with a risk of outcome of under-five child

death of 2.684 with confidence intervals of 1.419-5.075. The risk of child mortality when the mother was exposed to severe violence was 3.736 with confidence intervals of 1.890-7.385. For exposure to violence during the index pregnancy, the risk of child mortality following were 3.411 with confidence intervals of 0.475 -7.888 while the risk for exposure to severe violence during pregnancy was 5.427 with confidence intervals of 1.939-15.185.

The population Attributable risk for the study population was calculated for severe violence in the household, for total deaths and deaths exclusive of early neonatal deaths. This population had been exclusive of biological co morbidities such as very low birth weight and preterm babies, and severe congenital anomalies. The population attributable risk for severe violence of the husband against her was 50 %. This means that we can hope to reduce our under-five child mortality by 50 percent among children without severe co morbidities if the risk factor of violence was eliminated from the population. The population attributable risk for violence using the odds ratio obtained from the multivariate analysis is 46.5 %.

After excluding early neonatal deaths form the analysis, the population attribution risk for severe violence as a risk factor for under-five mortality was found to be 47.9%. This means that we can hope to reduce our under-five child mortality by 47.9% among children without severe illness and due to perinatal conditions if the risk factor of violence was eliminated in the population

Maternal depression:

Pre-existing maternal depression was seen in 21.5 percent of the control group and 40.2 percent of the cases. Depression due to or surrounding bereavement were excluded as positive for depression as designed in the used tool. But major depression was seen in 6.3 percent of the mothers of controls and 18.3 percent of the mothers of cases. Mild to moderate depression accounted for 15.2 percent of depression among the mothers of controls and 22.0 percent of the mothers of cases.

Effect of maternal factors for under-five deaths

Studies showed that higher age and parity as well as unemployment were associated with childhood mortality[39]. However this present study did not show any association with maternal age, being younger or older, and her occupation. Multi-parity is a known risk factor[6]. This study confirms this fact as well.

Maternal depression has been shown to affect infant and child morbidity[42, 46]. It has also been shown to be associated with failure to thrive and malnutrition in the infant. Maternal depression has been shown to be associated with many adverse health outcomes among the offspring of depressed women, including preterm birth, low birth weight, newborn irritability, developmental delays, somatic complaints, sleep problems, child abuse, and psychiatric and neurobehavioral disorders[48]. The present study brings out an association of maternal depression with increasing risk of infant and child mortality (OR 2.456, 95%CI 1.226-4.920).

Effect of paternal factors for under-five deaths

Not many studies have been done to show association of paternal factors with child health and disease. In a study done to determine paternal risk factors for low birth weight and prematurity, none were found to be significant[64]. In our study, the paternal factors studied were literacy and years of education, occupation, use of alcohol and smoking behaviour. Though illiteracy of father was found to be associated with child death (OR 1.905), 95% CI 0.914-3.967 was not significant. However, the sample size might not be adequate. Literacy is a proxy marker for socioeconomic status.

There are no studies to show an association between child death and paternal alcohol consumption and smoking habits. The present study identifies paternal consumption of alcohol as a risk factor for child mortality with a risk of 2.070 (95% CI 1.102-3.891). The risk of under-five death is 3.736 times as likely to occur (95% CI 1.890-7.385) in a household where the father smokes than a household in which he does not. The causal mechanism may not be direct though direct trauma causing injury to the child following inebriation by alcohol is a possibility. It might be possible that the paternal habits cause stress to the mother, can lead to conflict over issues and result in episodes of violence. Smoking might be suggestive of a particular personality type. Fathers who both use alcohol and smoke also have an association with poor infant survival.

Studies done by Jeejeebhoy in Uttar Pradesh and Tamil Nadu show an association of domestic violence with women who are not participants in the decisions made in the family

and who have no control over the resources of the family, though not very strong[23]. The present study does not show this. Factors regarding decision making capacity and resource control in the house did not have an effect on the risk of child death

Effect of socio economic factors for under-five deaths

The effect of social and environmental factors on infant survival is a well studied phenomenon[39]. Our study confirms this fact. The households with debt are 2.3 times as likely to have an infant or child death as those household who do not (95% CI 0.878-6.064). The households who are so poor that they cannot always buy food and sometimes don't even have three meals a day seem to have a higher risk of under five child and child death among their children (OR 2.654 with 95% CI 1.390-5.066 and 2.137 with 95% CI 1.808-2.526 respectively). Answers to the problems of under-five child mortality cannot be found by secondary prevention methods such as early diagnosis and prompt treatment, but require a greater focus on the primary prevention methods that seek to improve standards of hygiene and living.

Summary of the univariate and multivariate analysis

Since infant and child mortality are problems of multifactorial etiology, several factors that were known and suspected to be associated with infant and child deaths were studied. Many variables that were thought to be significant did not turn out to be so. Low maternal age at marriage and illiteracy were suspected to be significant risk factors but were not so according

to our study. The possible reasons for this could be that the sample size was inadequate to pick up the difference in the cases and controls with respect to the risk factors.

The variables that were thought to be significant were chosen and a model for logistic regression was created so as to explain their association with under-five child mortality. Another model was created looking at only the variables which were actually significant.

After adjusting for the following possible confounders, socio-economic status, birth wt, education of mother, age of mother, occupation of mother, affordability to buy food, debts, husband's education and maternal depression, the risk factors for under-five mortality, only three variables were significant. The factors which were significant in the multivariate analysis in both models were interestingly, multiparity of the mother (Odds ratio of 2.681 with 95%CI of 1.226-5.863), paternal smoking (Odds ratio of 3.172with 95%CI of 1.529-6.580) and severe violence towards the mother of the child by the father (odds ratio of 3.172 with 95%CI of 1.529-6.580). Multi parity is a seen risk factor[6], smoking and drug abuse have known to be risk factor for violent behaviour, but studies have not shown it to be independently linked with infant and under-five deaths. Paternal alcohol use was seen to be significant in the univariate analysis, but did not remain significant in the multivariate analysis.

However, after excluding the early neonatal deaths from the analysis, the parity of the mother did not show significant association. Instead, the number of living children the mother had prior to this child became significant (OR 2.98, 95%CI: 1.15 – 7.68, for having more than

one child). The paternal smoking (OR 4.3, 95%CI- 1.87-9.9) and severe violence (OR 3.39, 95%CI – 1.48 – 7.77) were also significant. Parity did not rise in this equation as significant, possibly because the mothers with higher parity would have also been high risk mothers with early neonatal deaths.

7. LIMITATIONS

Sample size was calculated based on the prevalence of domestic violence. Therefore, it is a possibility that the other likely factors for child mortality did not emerge as significant because of an inadequate sample size.

Because the exposure data were obtained retrospectively, the possibility that recall bias accounted for some or all of the reported associations cannot be excluded. Women in abusive relationships may have remembered their experiences differently.

Lifetime experiences of domestic violence and maternal depression were asked for and therefore the exact causal mechanism cannot be ascertained. The timeline of the questions may not have been very accurate. Information regarding the possibility of child abuse or direct trauma was not obtained in order not to blame or distress the respondent.

Details regarding smoking and alcohol abuse were not obtained. The pattern of paternal smoking and alcohol use could have helped in formulating a causal mechanism.

8. RECOMMENDATIONS

With the characteristics of the households who are subjected to violence, it is possible to create a scoring system to identify the households in the community that are likely targets for abuse.

New knowledge on the effects of paternal substance abuse on the family can be used to incorporate a program on lifestyle modification into the existing health care system

Verbal Autopsy methods can be improvised to look for violence related risk factors of death.

Violence against women represents an important public health concern, not only for women's health but also children's survival. Further studies need to be done in this Subject. The findings could have a significant impact on the public health approach to infant mortality rate reduction by focusing also on the psychosocial elements surrounding infant survival.

9. SUMMARY

The perinatal and infant mortality in Kaniyambadi block during the period January 2001 to December 2006 was 35 and 14.6 per 1000 live births. The total under-5 mortality rate was 44 per 1000.

The mothers of 82 cases and 79 controls were interviewed. A total of 52.4%of mothers of cases had a lifetime experience of severe physical and /or sexual violence compared with 22.8 % of mothers of controls, (OR 3.736,95%CI 1.890-7.35).A total of 40.2% of mothers of cases had a lifetime experience of depression compared with 21.5% of mothers of controls (OR 2.456, 95%CI 1.226-4.920)

Factors that were found to be significant on the univariate analysis were education of the mother, multiparity of the mother, Literacy of the father, paternal use of alcohol and paternal smoking, the presence of debts in the household, inability to buy food everyday and having less than three meals a day, some days.

After adjusting for age of mother, parental literacy and occupation, the factors that remained significant were multiparity, paternal smoking and severe violence.

10. CONCLUSIONS

The results of the study suggest an association between physical and sexual violence against mothers and an increased risk of mortality of their under-five offspring.

There is also an association between pre-existing maternal depression and an increased risk of mortality of their under-five children.

Other factors that seem to be associated with child mortality are increasing parity of the mother and paternal smoking.

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12. APPENDIX

APPENDIX 1: QUESTIONNAIRE ON DOMESTIC VIOLENCE

I) Demographics
a. Mothers age
b. Parity
c. Education
d. Occupation

II) Autonomy
a. Decision making
b. Resource control

III) Violence
1. Have you been slapped(open hand)?
a. Ever
b. During the last pregnancy
c. During the year following delivery
d. By whom
e. How often

2. Have you been hit?(closed hand)
a. Ever
b. During the last pregnancy
c. During the year following delivery
d. By whom
e. How often

3. Have you been Punched?(closed fist)
a. Ever
b. During the last pregnancy
c. During the year following delivery
d. By whom
e. How often

4.4. Have you been kicked?(with foot)
a. Ever
b. During the last pregnancy
c. During the year following delivery
d. By whom
e. How often

5.5. Have you been beaten?(repeatedly)
a .Ever
b. During the last pregnancy
c. During the year following delivery
d. By whom
e. How often

6. 6.Have you been threatened or hit with a weapon?
a. Ever
b. During the last pregnancy
c. During the year following delivery
d. By whom
e. How often

77.Does your partner force you into sex?
How often

8.8.Are you afraid of your partner?

9.9. How has violence affected your well being?
(n (none, little, much , very much)

APPENDIX 2: PROXY SES INDICATORS

1) Patient ID no:
2) Age
3) Name
4) Husbands name
5) Address
6) Marital status 1.Single 2.Married 3.widow 4.Separated 5.Divorced
7) Patient status 1. Selected for study
   2.Not selected for study
   3.Eligible,but not willing
   4.Other reasons
8) Years of education
9) Literacy 1.Illiterate2.Read only3.Read and write
10) Residence 1.Urban 2.Rural
11) Religion 1.Hindu 2.Christian 3.Muslim 4.Others
12) Occupation
13) Age of mother at time of marriage
14) Number of people in the house hold
15) House 1. Own 2.Rented
16) Type of house 1.Mud 2.Thatched 3. Concrete
17) Size of the house
18) Drinking water 1.well 2.tap 3.Borewell
19) Latrine or pit 1.yes 2.no
20) Distance between home and health centre
21) No : of meals per day
22) Unable to buy food in the past
23) Financial debt 1.yes 2.no if yes specify
24) No of children
25) Sex of children
26) Disability in children 1.physical 2.mental
27) Place of birth for children 1.hospital 2. home and who conducted
28) Medical complications during pregnancy 1.yes 2.no
29) If yes, specify
30) Type of delivery 1.normal 2.instumental 3 LSCS
31) Husbands age
32) Literacy 1.Illiterate 2.Read only 3.Read &Write
33) Occupation
34) Alcohol use
35) Smoking
36) Study explained and consent taken